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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/779,565	02/09/2001	Takao Kamoshima	49657-986	6592

7590 07/26/2002

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EXAMINER


LE, THAO X

ART UNIT	PAPER NUMBER
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2814

DATE MAILED: 07/26/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	09/779,565	KAMOSHIMA ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
Thao X Le	2814		

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
     If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
     a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
     a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                  | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). ____.  |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                         | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) <u>2</u> . | 6) <input type="checkbox"/> Other: _____                                    |

## **DETAILED ACTION**

### ***Specification***

1. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

### ***Claim Rejections - 35 USC § 112***

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 3-5, 9-10 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. 'said conductive layer' in claims 3-5 and 9-10 are not clear whether it refers to first, second or third conductive layers.

### ***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under

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37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claim 1, 3-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant Admitted Prior Art (APA), and further in view of US 5,244,509 to Arao et al.

Regarding to claim 1, APA discloses in pages 1-2, fig. 18-20, a semiconductor device, comprising a semiconductor substrate 101 and including polycrystals a conductive layer 105, including in its surface a recess 106 caused by a crystal grain boundary, page 1 line 25. Bur APA does not expressly disclose the recess having side walls formed such that a distance therebetween becomes small as closer to semiconductor substrate. However, Arao reference discloses the Aluminum conductive layer 102, fig. 1 column 6 line 22-23, comprising the recess having side walls formed such that a distance therebetween becomes small as closer to substrate (concave portion), see fig. 1, by controlling the crystal grain, column 6 line 52-57. At the time of the invention was made; it would have been obvious to one of ordinary skill in the art to combine the concave surface teaching of Arao with APA, because it would have formed a recess (concave) surface economically, column 6 line 62-65 and provided an improved reflective substrate, column 3, lines 24-27.

Regarding to claim 3, APA discloses the semiconductor device further comprising a thin film layer 109 formed on the conductive layer and having a material different from that of conductive layer, page 1 line 27.

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Regarding to claim 4, APA discloses the semiconductor device wherein conductive layer (assume any layer) 105 includes aluminum, page1 line 17.

Regarding to claim 5, APA disclose the semiconductor device further comprising an insulating layer 102, page 1 line 17, formed on the semiconductor substrate and a barrier layer 103, page 1 line 16, formed on insulating layer, and conductive layer (assume any layer) being formed on barrier layer, fig. 19.

Claim 2, 6-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over APA and US 5,244,509 as applied to claim1 above, and further in view of US 5,950,105 to Jung et al.

Regarding to claim 2, APA discloses the semiconductor device wherein conductive layer 105 includes a first conductive layer formed on semiconductor substrate and including a polycrystals having a first grain size. But APA does not expressly disclose the second conductive layer formed on the semiconductor substrate and including a polycrystal having a second average grain size greater than first average grain size and having recess. However, Arao reference discloses the crystal grain average size of the conductive layer could be controlled by adjusting the temperature of the substrate, column 6 line 52-60. But Arao does not expressly disclose lower surface temperature would result in a smaller average grain size. But Jung reference discloses the small aluminum grain could be obtained with low temperature deposition, column 6 line 36-41. At the time of the invention was made; it would have been obvious to one of ordinary skill in the art to combine the teaching of Jung with APA and Arao, because it would have resulted in desired recess surface for a semiconductor device economically, column 6 line 62-65 and provided an improved reflective substrate, column 3, lines 24-27.

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Regarding to claim 6, 7 as discussed in claim 2 above, APA, Arao and Jung, disclose all the limitations in claim 6, except a third conductive layer formed on the second conductive layer and including a polycrystals having a third average grain size smaller than second average grain size. However, Arao reference discloses a multi-layer structure, fig. 2. At the time of the invention was made; it would have been obvious to one of ordinary skill in the art to combine the teaching of Jung with APA and Arao, because it would have resulted in desired recess surface for a semiconductor device economically, column 6 line 62-65 and provided an improved reflective substrate, column 3, lines 24-27.

Regarding to claim 8, APA discloses the semiconductor device further comprising a thin film layer 109 formed on the conductive layer and having a material different from that of conductive layer, page 1 line 27.

Regarding to claim 9, APA discloses the semiconductor device wherein conductive layer (assume any layer) 105 includes aluminum, page1 line 17.

Regarding to claim 10, APA disclose the semiconductor device further comprising an insulating layer 102, page 1 line 17, formed on the semiconductor substrate and a barrier layer 103, page 1 line 16, formed on insulating layer, and conductive layer (assume any layer) being formed on barrier layer, fig. 19.

### ***Conclusion***

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

a. US 5,904,556

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- b. US 5,804,879
- c. US 6,123,992
- d. US 5,869,901

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thao X Le whose telephone number is 703-306-0208. The examiner can normally be reached on M-T from 7:00 AM - 5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 703-306-2794. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

Thao X. Le  
July 24, 2002

  
PHAT X. CAO  
PRIMARY EXAMINER